

AMENDMENTS TO THE CLAIMS

This listing of the claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A power toothbrush comprising a brush head and an actuator for moving the brush head, wherein

the actuator ~~further comprises~~ comprising a drive shaft to which the brush head is fitted, a first magnetic circuit for reciprocally moving the drive shaft in an axial direction thereof, and a second magnetic circuit for reciprocally rotating the drive shaft around the center axis thereof, wherein the first magnetic circuit and the second magnetic circuit directly move the drive shaft;

the first magnetic circuit further comprises a first permanent magnet unit fixed on the drive shaft, a pair of first stators and a pair of first ~~winding~~ windings respectively wound around the first stators;

the second magnetic circuit further comprises a second permanent magnet unit fixed on the drive shaft, a pair of second stators and two pairs of second ~~winding~~ windings respectively wound around poles of the second stators;

the first permanent magnet unit ~~which moves~~ moving linearly in the axial direction of the drive shaft while a driving current is supplied to the first windings;

the second permanent magnet unit ~~which rotates~~ rotating around the center axis of the drive shaft while a driving current is supplied to the second windings; [[and]]

a pair of coil springs which apply pressing forces to position the first permanent magnet unit and the second permanent magnet unit at initial positions while the actuator is not activated;

an amplitude of a reciprocal movement of the brush in an axial direction of the drive shaft is equal to or smaller than 4mm;

a frequency of the reciprocal movement of the brush in an axial direction of the drive shaft is in a range of 100 Hz to 350 Hz; and

an angle of a reciprocal swing motion of the brush around a center axis of the drive shaft is equal to or smaller than 20 degrees.

2. (Original) The power toothbrush in accordance with claim 1; wherein the first magnetic circuit and the second magnetic circuit can be activated, simultaneously.

3. (Previously Presented) The power toothbrush in accordance with claim 1, wherein the first magnetic circuit and the second magnetic circuit can be alternatively activated.

4. (Previously Presented) The power toothbrush in accordance with claim

1, further comprising:

an inverter for generating two driving currents having predetermined frequencies and a phase difference therebetween, the two driving currents being supplied to the first magnetic circuit and the second magnetic circuit.

5. (Original) The power toothbrush in accordance with claim 4, wherein the driving currents are alternating currents or pulsating currents.

6. (Currently Amended) The power toothbrush in accordance with claim 4, wherein

the frequencies of and/or the phase difference between the driving currents supplied to the first magnetic circuit and the second magnetic circuit ~~are/is~~ being adjustable.

7. (Previously Presented) The power toothbrush in accordance with claim 1, further comprising:

an inverter for generating two driving currents having predetermined frequencies, the two driving currents being supplied to the first magnetic circuit and the second magnetic circuit, wherein the driving currents supplied to the first magnetic circuit and the second magnetic circuit are in phase.

8. (Previously Presented) The power toothbrush in accordance with claim

4, wherein

the phase difference between the driving currents supplied to the first magnetic circuit and the second magnetic circuit is $\pi/2$ or $\pi/4$.

9. (Currently Amended) The power toothbrush in accordance with claim 4, wherein

a frequency of a driving current supplied to the first magnetic circuit is equal to [[or]] an integral multiple of a frequency of a driving current supplied to the second magnetic circuit.

10. (Currently Amended) The power toothbrush in accordance with claim 4, wherein

a frequency of a driving current supplied to the second magnetic circuit is equal to [[or]] an integral multiple of a frequency of a driving current supplied to the first magnetic circuit.

11. (Previously Presented) The power toothbrush in accordance with claim 4, wherein

a ratio of a larger one in the frequencies of the driving currents supplied to the first magnetic circuit and the second magnetic circuit with respect to a smaller one of them is not an integer.

12. (Canceled)

13. (Canceled)

14. (Currently Amended) The power toothbrush in accordance with claim 1, wherein

the first magnetic circuit is periodically driven by switching on and off of ~~supplying a driving current~~ supply; and

the reciprocal movement of the drive shaft in the axial direction is sustained owing to sympathetic vibrations of the coil springs while the driving current is not supplied to the first magnetic circuit.

15. (Currently Amended) The power toothbrush in accordance with claim 1, wherein

the second magnetic circuit is periodically driven by switching on and off of ~~supplying a driving current~~ supply; and

the reciprocal rotation of the drive shaft around the center axis of the drive shaft is sustained owing to sympathetic vibrations of the coil springs while the driving current is not supplied to the second magnetic circuit.

16. (Currently Amended) A power toothbrush comprising:

a brush head and an actuator which moves the brush head, wherein the

actuator comprises a drive shaft to which the brush head is fitted, a first magnetic circuit configured to reciprocally move the drive shaft in an axial direction thereof, and a second magnetic circuit configured to reciprocally rotate the drive shaft around the center axis thereof, wherein the first magnetic circuit and the second magnetic circuit ~~directly~~ are configured to directly move the drive shaft;

an inverter configured to generate two driving currents having predetermined frequencies, the two driving currents being supplied to the first magnetic circuit and the second magnetic circuit; [[and]]

wherein the driving currents supplied to the first magnetic circuit and the second driving circuit are in phase;

an amplitude of a reciprocal movement of the brush in an axial direction of the drive shaft is equal to or smaller than 4mm;

a frequency of the reciprocal movement of the brush in an axial direction of the drive shaft is in a range of 100 Hz to 350 Hz; and

an angle of a reciprocal swing motion of the brush around a center axis of the drive shaft is equal to or smaller than 20 degrees.

17. (Currently Amended) The power toothbrush in accordance with claim 16, wherein

a frequency of a driving current supplied to the first magnetic circuit is equal to [[or]] an integral multiple of a frequency of a driving current supplied to the second magnetic circuit.

18. (Currently Amended) The power toothbrush in accordance with claim 16, wherein

a frequency of a driving current supplied to the second magnetic circuit is equal to ~~[[or]]~~ an integral multiple of a frequency of a driving current supplied to the first magnetic circuit.

19. (Previously Presented) The power toothbrush in accordance with claim 16, wherein

a ratio of a larger one in the frequencies of the driving currents supplied to the first magnetic circuit and the second magnetic circuit with respect to a smaller one of them is not an integer.

20. (Currently Amended) A power toothbrush comprising:

a brush head and an actuator configured to move the brush head, wherein the actuator comprises a drive shaft to which the brush head is fitted, a first magnetic circuit configured to reciprocally move the drive shaft in an axial direction thereof, and a second magnetic circuit configured to reciprocally rotate the drive shaft around the center axis thereof, wherein the first magnetic circuit and the second magnetic circuit ~~directly~~ are configured to directly move the drive shaft; ~~[[and]]~~

an inverter configured to generate two driving currents having

predetermined frequencies and a phase difference therebetween, the two driving currents being supplied to the first magnetic circuit and the second magnetic circuit, wherein the phase difference between the driving currents supplied to the first magnetic circuit and the second magnetic circuit is $\pi/2$ or $\pi/4$;

an amplitude of a reciprocal movement of the brush in an axial direction of the drive shaft is equal to or smaller than 4mm;

a frequency of the reciprocal movement of the brush in an axial direction of the drive shaft is in a range of 100 Hz to 350 Hz; and

an angle of a reciprocal swing motion of the brush around a center axis of the drive shaft is equal to or smaller than 20 degrees.

21. (Currently Amended) The power toothbrush in accordance with claim 20, wherein

a frequency of a driving current supplied to the first magnetic circuit is equal to [[or]] an integral multiple of a frequency of a driving current supplied to the second magnetic circuit.

22. (Currently Amended) The power toothbrush in accordance with claim 20, wherein

a frequency of a driving current supplied to the second magnetic circuit is equal to [[or]] an integral multiple of a frequency of a driving current supplied to the first magnetic circuit.

23. (Previously Presented) The power toothbrush in accordance with claim 20, wherein

a ratio of a larger one in the frequencies of the driving currents supplied to the first magnetic circuit and the second magnetic circuit with respect to a smaller one of them is not an integer.